

Guide for
Architects - Engineers

Design Criteria

1.1 General Instructions. All projects shall conform to the criteria contained in the references indicated, unless the A-E is given instructions in writing to the contrary. In cases where a District review determines criteria has not been followed, the A-E will be required to conform his design to the criteria at his own time and expense, per paragraph 2 of the General Provisions of the A-E contract.

1.2 Date of Publications. To eliminate the need to continually change the dates of the criteria references, dates have not been shown. The A-E will be issued the latest copy for all District publications requested. Since the criteria often changes, the A-E shall obtain the up-to-date material and discard criteria from any past District projects. For all non-Corps of Engineers references, the A-E shall use those latest editions at the time his contract is signed. If there is any question regarding this issue, it should be brought up and discussed at the prenegotiation conference.

1.3 Availability of Criteria. Publications such as guide specifications, TM s, AFM s, DM s, DOD manuals, and Seattle District prepared manuals are available on request. Other Government documents which are not available from the District will be so noted in the criteria list. The A-E is responsible for obtaining these items from the appropriate Government agencies. All other references, such as American Concrete Institutes, "Building Code Requirements for Reinforced Concrete," will be obtained by the A-E from other sources.

1.4 Conflicts in Criteria. In many instances, a subject has more than one criteria reference. These references may give conflicting information on a given point. In all cases, the Government publication will control over non-Government publications and Seattle District references will control over other Government references, unless otherwise stated. If there is any doubt regarding the controlling criteria, the A-E should contact the PM

1.5 Criteria Index. The criteria that follows has been organized by discipline, with subjects listed alphabetically by key word to insure easy success by the designer. Each of the references should be thoroughly examined by the A-E to make certain that all applicable criteria has been met. Use the references for both Army and AF projects, unless noted otherwise in the remarks column.

1.6 Amended Criteria. It is sometimes necessary to update portions of the TM s, AFM s, DM s, and DOD manuals with Air Force/AFRCE/OCE guidance letter of revision or correction. A current list of these letters will be provided to the A-E by the PM

1.7 Drafting Standards (Simple Drawings). The sample drawings provides guidance for desired drafting symbols, sheet layout, graphic quality, and other information relevant to drawing production.

1.8 Standard Details. Standard detail drawings are available upon request. The PM can provide pertinent details as required to assist the A-E.

CIVIL

Subject	Criteria References	Remarks
Airfield and Heliport Planning Criteria	TM 5-803-7	
Airfield Design, General	TM 5-824-1/AFM 88-6, Chapter 1	Defines traffic areas.
Airfield Markings	AFR 88-1s TM 5-823-4	Air Force only Army
Arms Range, Small Arms	AFM 50-25	Air Force only.
Backfill for Subsurface Structures	TM 5-818-4	
Design Analysis	ER 1110-345-700	Covers all disciplines.
Details	Standard Details for Utilities, Foundations, Paving, and Railroads require.	Details may be modified as conditions
Drainage and Grading	AFM 88-15, Chapter 15, Section C	AF only. For airfields, roadways, and built-up areas.
Drainage, Surface for Airfields and Heliports	TM 5-820-1/AFM 88-5, Chapter 1	
Drainage, Subsurface for Airfields	TM 5-820-2/AFM 88-5, Chapter 2	
Drainage and Erosion Control Structures for Airfields and Heliports	TM 5-820-3/AFM 88-5, Chapter 3	
Drainage, Areas Other than Airfields	TM 5-820-4/AFM 88-5, Chapter 4	
Environmental Impact	DA PAM 200-1 (Army Pamphlet)	

CIVIL

Subject	Criteria References	Remarks
Fence, Chain Link	Guide Specifications, CEGS 02444	
Fire Protection for Facilities (Engineering, Design & Construction)	MLL-HDBK-1008	
Landscaping, Planting Design	TM 5-803-5/AFM 88-43	
Landscaping, Planting Turf	TM 5-830-2/AFM 88-17, Chapter 2	
Landscaping, Dust Control	TM 5-830-3/AFM 88-17, Chapter 3	
Landscaping, Planting and Maintenance of Trees, Shrubs, and Vines	TM 5-830-4/AFM 88-17, Chapter 4	Some bases have a list of trees, shrubs, and vines suitable for that locale. Contact the PM for that list.
Pavements, General Provisions, Geometric vision for Roads, Streets, Walks, and Open Storage Areas	TM 5-822-2/AFM 88-7, Chapter 5	
Pavements, Personnel Parking	TM 5-803-5 EIRS Bulletin 81-05	
Pavements, Handicapped Uniform Federal Accessibility Standards Personnel Parking		
Pavements, Soil Stabilization for Road/ Streets	TM 5-822-4/AFM 88-7, Chapter 4	
Pavements, Flexible for Roads, Streets, Walks, and Open Storage Areas	TM 5-822-5/AFM 88-7, Chapter 3	
Pavements, Rigid, for Roads, Streets, Walks, and Open Storage Areas	TM 5-822-s/AFM 88-7, Chapter 1	

CIVIL

Subject	Criteria References	Remarks
Pavements, Concrete, Standard Practice	TM 5-822-7/AFM 88-6, Chapter 8	
Pavements, Bituminous, Standard Practice	TM 5-822-8/AFM 88-6, Chapter 9	
Pavements, Rigid, Repair of	TM 5-822-9	
Pavements, Flexible, Airfield-Heliport	TM 5-823-2	Army only.
Pavements, Rigid and Overlay, Airfield and Heliport	TM 5-823-3	Army only.
Pavement, Design for Frost Conditions	TM 5-818-2	
Foundations in Expansive Soils	TM 5-818-7	
Pavements, Rigid Airfields Other Than Army	TM 5-824-3/AFM 88-s Chapter 3	
Planning, Master	ASCE Urban Planning Guide, TM 5-803-1 and TM 5-803-5/AFM 88-43 Installation Design	Principles and procedures.
Planning in the Noise Environment.	TM 5-803-2/AFM 19-10	General information.
Planning, Army Aviation Facilities	TM 5-803-4	Army only.
Planning, Site, Community Centers	TM 5-803-s	
Planning, Outdoor Sports Facilities	TM 5-803-10/AFR 88-3	
Planning, Childrens Play Areas and Equipment	TM 5-803-11/AFM 88-30	

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Subject Criteria References		Remarks
Planning, Outdoor Recreation Facilities	TM 5-803-12	
Planning, Master Base	Air AFM 86-6	AF only.
Planning, Airfield and Airspace	AFM 88 4, Chapter 5	AF only.
Railroad Design	TM 5-850-2/AFM 88-7, Chapter 2	
Reserve Center, Army Design Guide	DG 1110-3-107	
Sewage, General Considerations	ASCE Glossary-Water and Wastewater Control Engineering; AFM 88-15, Chapter 2	AFM 88-15, Chapter 11, applies to AF only.
Sewage, Sanitary, and Industrial Waste Sewers	TM 5-814-1/AFM 88-11, Volume 1; AFR 88-15, Chapter 15, Section B; ASCE Manual No. 37; Guide Specification, CEGS 15302	Gravity Sewers: Pipe materials and bedding, refer to guide specification. Pipe materials for AF refer to AFM 88-15, Chapter 11, Section B.
Sewage and Industrial Waste Pumping Stations	TM 5-814-2/AFM 88-11, Volume 2; AFR 88-15, Chapter 15, Section B; ASCE Manual No. 37	TM 5-814-2/AFM 88-11, Chapter 2, Controls Design. AFM 88-15 applied to AF only.
Sewage, Treatment Plants	TM 5-814-3/AFM 88-11, Volume 3; AFR 88-15, Chapter 15; ASCE Manual No. 3s; EPA Process Design Manuals; EPA Technology Transfer Seminar Pubs	TM 5-814-3/AFM 88-11, Chapter 3, Controls Design. AFM 88-15 applies to AF only.
Site Criteria	Architectural and Engineering Instructions; TM 5-803-5; AFM 88-2	
Solid Wastes, General Considerations	AF 88-15, Chapter 15, Section D	AF only.

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Subject	Criteria References	Remarks
Solid Wastes, Sanitary Landfill	TM 5-814-5/AFM 88-11, Chapter 5; ASCE Manual No. 39 5, Controls	TM 5-814-5/AFM 88-11, Chapter Design.
Symbols	Standard Details for Utilities, Foundations, Paving, and Railroads	Symbols shown are mandatory.
Utility, Services, and Siting	AFR 88-15, Chapter 15, Section E	AF only.
Water, General Considerations	ASCE Glossary - Water and Control Engineering, TM 5-813-1/AFM 88-10, Volume 1	Definition and general policies.
Water Distribution Systems	TM 5-813-5/AFM 88-10, Chapter 5	
Water Systems, Design of Small	EM 1110-2-503	
Water, Sources		
Water Storage	TM 5-813-4/AFM 88-10, Chapter 4	
Water, Supply	AFR 88-15 TM 5-813-4 of materials to be	AF only. This provides guidance in selection used in water supply treatment and distribution facilities.
Water, Supply for Fire Protection	TM 5-813-s/AFM 88-10, Chapter 6	Prescribes water supply requirements for fire protection at the installation level and requirements to the vicinity of a facility.
Water, Supply for Special Projects	TM 5-813-7/AFM 88-10, Chapter 7 and Reserve Centers.	For antiaircraft tactical sites, including family housing, Air Control and Warning Stations

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Subject	Criteria References	Remarks
Water Treatment	ASCE Manual - Water Treatment Plant Design; TM 5-813-3/AFM 88-10, Chapter 7	Approval of water quality is the responsibility of the Medical Department activity. In case of conflict, the TM/AFM controls.

ARCHITECTURAL

Subject	Criteria References	Remarks
Air Force Design, General	AFR 88-15	
Army Design, General Definitions of ant Fire-Resistive Requirements for Types of Construction	Army-AEI Design Criteria Air Force-AFR 88-15	
Allowable Floor Areas (Fire Areas) Based on Occupancy, Type of	Army-AEI Design Criteria and UBC; Air Force AFR 88-15	Based on occupancy and type of construction as Construction defined in UBC.
Occupancy Separation and Enclosures	Army-AEI Design Criteria and UBC, Table 5B; Air Force-AFR 88-15, Table 5B	Note: Only outside entrance into mechanical rooms permitted.
Separation/Spacing Between Buildings and Area Separation Walls	AEI Design Criteria (MIL-HDBK-1008), Air Force-AFR 88-15	
Protection of Openings, Fire Doors, Hardware, Windows	NFPA 80	Must be used for all fire doors and windows
Egress and Exit Requirements	NFPA 101, Based on NFPA Occupancy Classification	Apply to determine occupant load, number and width of exits, travel distances, dead end limits, etc.
Smoke Barriers	NFPA 101	Follow for specific occupancy requirements
Additional Life Safety/ Occupancy Requirements	NFPA 101; UBC	Check for additional occupancy specific requirements.

ARCHITECTURAL

Subject	Criteria References	Remarks
Interior Finish Fire Class (Flame Spread and Smoke Developed)	Army-AEI, Design Criteria Air Force-AFR 88-15	
Thermal Insulating Material Restrictions	Army-AEI Design Criteria; Air Force-AFR 88-15	
Carpet Limitations As Finish	Army-AEI Design Criteria; Air Force-AEI 88-15	
Fire Protection - Sprinkler Systems, Detection and Alarm Systems	Army-AEI Design Criteria; Air Force-AFR 88-15	Apply referenced NFPA as indicated.
Caulking and Sealants 805-6	Air Force-AFR 88-15, TM 5-805-s/ AFM 88 4, Chapter 7; Army- the guide specification. Standard Details in lieu of those	Joints must be detailed to coordinate with TM 5- Request the generic drawings to be used shown on the
TM		
Paints and Protective Coatings	TM 5-618	
Colors	District Acceptable Manufacturers Standard	Must be used to select and list paint colors. No other system is permitted.
Color Selection	Air Force Project Book; Army-AEI Design Criteria and TM 5-807-7	
Doors	AEI Design Criteria	
Flashing Joints, Sheet Metal	Guide Specifications Supplemented by Architectural Sheet Metal Manual by Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA)	
Hardware, Builders	CEGS 08710	

ARCHITECTURAL

Subject	Criteria References	Remarks
Insulation	Guide Specification CE- 235. 03, CEGS- 07241, and CE04230	
Interior Finishes	AEI Design Criteria and AFR 88- 15	
Kitchen Equipment, Army Reserve Centers and Army Enlisted Personnel	Food Service Equipment/Details by USA Troop Support Agency, Ft. Lee, Virginia Dining Facilities	
Kitchen Equipment (Air Force)	Specified Criteria Will be Provided for Each Project.	
Masonry Wall, "U" Values	Army- AEI Design Criteria Air Force- AFR 88- 15	
Materials of Construction	Army- AEI Design Criteria Air Force- AFM 88- 15	
Medical Facilities	TM 5- 838- 2 and Other Project Directives	Army only.
Medical Facilities	AFR- 88- 50 and other Project Directives	AF only.
Occupational Safety and Health try Standards	EM 385- 1- 1, OSHA, General Indus-	More stringent criteria governs.
Partition Framing	NFPA 220, Guide Specification CE- 235- . 02	
Physically Handicapped	AEI Design Criteria UFAS (uniformed Federal accessibility standard)	Applies to all designs, unless specifically exempted.
Roof Decking	Army- TM 5- 805- 3, TM 5- 805- 14; Air Force- AFR 88- 15	Describes types of decking permitted. Warning: Wood shown is rarely permitted.

ARCHITECTURAL

Subject	Criteria References	Remarks
Roofing	Guide Specifications CEGS- 07311, CE- 222. 01, CE- 222. 02, CEGS- 07414, CEGS- 074s3, CEGS- 07510, CE 220. 13, and CE- 220. 15	
Waterproofing	Guide Specifications CEGS- 071s0,	

STRUCTURAL

Subject	Criteria References	Remarks
Aluminum Structural	The Aluminum Association, "Specifications for Aluminum Structures."	
Anchor Bolts, Strength of	TM 5-809-10/AFM 88-3, Chapter 13	
Blast Design	TM 5-1300/AFM B8-15 Ch. 18 Sect. D (Fall Out Shelters)	TM 5-1300 is available on loan basis only.
Composite Decking	Design Manual for Floor Decks and Roof Decks by Steel Deck Institute	
Composite Design	ACI 318-Building Code Requirements for Reinforced Concrete; AISC's Manual of Steel Construction; TM 5-809-10/AFM 88-3, Chapter 13	
Concrete Design	ACI 318 Building Code Requirements for Reinforced Concrete	
Concrete Details	TM 5-809-2/AFM 88-3, Chapter 2; TM 5-809-10/AFM 88-3, Chapter 13	
Decking, Steel, Roof and Floor	TM 5-809-10/AFM 88-3, Chapter 13; Design Manual for Flood Decks and Roof Decks by Steel Deck Institute	
Expansion Anchors, Strength of	Federal Specification FF-S-325	Not available from District.
Expansion Joints	TM 5-809-2/AFM 88-3, Chapter 2	
Foundation Design	Geotechnical Report and Pavement Design; TM 5-809-2/AFM 88-3, Chapter 2; TM 5-809-10/AFM 88-3, Chapter 13; ACI 318 Building Code Requirements for Reinforced Concrete TM 5-818-1	

STRUCTURAL

Subject	Criteria References	Remarks
Frost Penetration	Geotechnical Report; TM 5-809-1/AFM 88-3, Chapter 1	
Glu-Lam Beams	AITC 117, Standard Specifications for Structural Glued Laminated Timber	
Gypsum Diaphragms	TM 5-809-10/AFM 88-3, Chapter 13	
Loads, Heavy Floor	TM 5-809-12/AFM 88-3, Chapter 15	
Lateral Loads (Interior)	TM 5-809-1/AFM 88-13, Chapter 1	
Loads, Live	TM 5-809-1/AFM 88-3, Chapter 1	
Loads, Snow	TM 5-809-1/AFM 88-3, Chapter 1	
Loads, Wind	TM 5-809-1/AFM 88-3, Chapter 1	
Masonry	TM 5-809-3/AFM 88-3, Chapter 3; Masonry Institute of America, Design Handbook	
Metal Buildings, Pre-Engineered	Guide Specification CECS 13120 and Metal Building Systems Manual by Metal Building MFGRS Association	See notes in rear of guide specifications.
Metal, Roofing and Siding 07413; NPS 07414; and	Guide Specifications CECS 07415	See notes in rear of guide specifications
Plywood	Plywood Design Specification, American Plywood Association	
Precast Concrete	TM 5-809-10/AFM 88-3, Chapter 13; Guide Specifications CECS 03450, PCI Design Handbook, Precast and Prestressed Concrete	
Prestressed Concrete	Tff 5-809-10/AFM 88-3, Chapter 13; and PCI Design Handbook Precast, and Prestressed Concrete	

STRUCTURAL

Subject	Criteria References	Remarks
Retaining Walls	EM 1110-2-2502; ACI 318 Building Code Requirements for Reinforced Concrete	
Security Construction	AFM 127-100	
Seismic Design	TM 5-809-10/AFM 88-3, Chapter 13 Letter: NPDEN-TE (Kenyon) to Seattle District of 1s Apr 84 Titled: Seismic Design for Buildings Use of Tension Only Diagonal Bracing	
Slabs on Grade, Subjected to Heavy Loads	TM 5-809-12/AFM 88-3, Chapter 15	
Steel, Cold Formed	American Iron and Steel Institute, Cold-Formed Steel Design Manual TM 5-809-10/AFM 88-3, Chapter 13	
Steel Joists	AISC's Manuals of Steel Construction; Steel Joist Institute Standard Specifications (SJI)	Tables and Weight Table for steel joists and joist girders.
Structural Steel	TM 5-809-10/AFM 88-3, Chapter 13; AISC's Manual of Steel Construction	
Timber Design	TM 5-809-5/AFM 88-3, Chapter 5; TM 5-809-10/AFM 88-3, Chapter 13; and National Design Specifications for Stress Graded Lumber and its Fastenings	
Vaults, Arm Storage and	DOD 5100.7s-M; Guide Specifications 08318	
Welding	AWS, Structural Welding Code	

MECHANICAL

Subject	Criteria References	Remarks
Energy Conservation Investment Programs (ECIP)	Annual Guidance Letter by OCE and AFRCE; AFR 88-15, Chapter 1	
Fire Protection, Classification of Occupancy, hazards, groups.	MIL-HDBK-1008	
Fire Protection, Data Processing Facilities	Army-NFPA 75; Air Force-AFR 88-15, Chapter 15	
Fire Protection, Fire Dampers	NFPA 90A required in 1-hour walls in addition to 2, 3, and 4.	Fire dampers will be
Fire Protection, General Requirements	Army-AEI Design Criteria; Air Force-AFR 88-15, Chapter 15	
Fire Protection, Special Hazards	MIL-HDBK-1008	
Fire Protection, Water Supply	MIL-HDBK-1008	
HVAC, Computer Simulation for Buildings	TM 5-810-1/AFR 88-15, Chapter 1 AEI Design Criteria on energy analysis	District will provide additional guidance requirements
HVAC, Energy Monitoring Control Systems	TM 5-815-2/AFM 88-3s	District may give and additional guidance.
HVAC, Fuel Selection	TM 5-810-1/AFR 88-15, Chapter 15	
HVAC, General Requirements	ASHRAE, Book of Fundamentals; NFPA 101; Army-TM 5-810-1, AEI Design Criteria, Chapter 13 Force-AFR 88-15, Chapters 15	District will provide additional Guidance on energy budgets.
HVAC, Health Facilities	AFR 88-50 (Air Force)	

MECHANICAL

Subject	Criteria References	Remarks
HVAC, Inside Design	TM 5-810-1/AFR 88-15, Chapter 15 Temperatures	
HVAC, Legend of Symbols	ASHRAE Handbook of Fundamentals	
HVAC, Mechanical Design	TM 5-810-1; ASHRAE Equipment Volume, ASHRAE Applications Volume; ASHRAE Systems Volume	
HVAC, Medical Facilities (Army)	TM 5-838-2, Chapter 8	Includes minimum air changes, outside air requirements, etc.
HVAC, Outside Design Temperatures	TM 5-810-1/AFR 88-15, Chapter 15	
HVAC, Perimeter Insulation	AEI Design Criteria, Chapter 13; AFR 38-15, Chapter 7	
HVAC, Seismic Design	TM 5-809-10/AFM 88-3, Chapter 13	Refer to chapters Mechanical and Electrical Elements."
HVAC, Solar	TM 5-810-1, AFR 88-15, Chapter 1	More specific criteria will be provided for each project
HVAC, Special Ventilation Applications	American Conference of Governmental Industrial Hygienist Manual	Use for exhaust hoods, paint spray booths, toxic vapors, etc. Not available from District.
HVAC, "U" Values	AEI Design Criteria, Chapter 13 AFR 88-15, Chapter 7	
Kitchen Equipment, Army Reserve Centers and Army Enlisted Personnel Dining Facilities	Food Service Equipment/Details by USA Troop Support Agency Ft. Lee, Virginia DG 1110-3-135 DG 1110-3-107	

MECHANICAL

Subject	Criteria References	Remarks
Kitchen Equipment (Air Force)	Specific criteria will be provided for each project.	
Occupational Safety and	EM 385-1-1; OSHA, General Industry Standards governs.	More stringent Health criteria
Plumbing, Code Requirements	National Standard Plumbing Code	
Plumbing, Compressed Air	TM 5-810-4/AFM 88-8, Chapter 3	
Plumbing, Design Analysis	TM 5-810-5/AFM 88-8, Chapter 4	
Plumbing, Drawing Requirements	TM 5-810-5/AFM 88-8, Chapter 4	
Plumbing, Fixtures and Piping Materials	TM 5-810-5/AFR 88-15, Chapter 15; Federal Specification WW-P-541; Military Specification T-12295 and H-12322	Proper selection of plumbing fixtures and equipment will require listed military and Federal specifications.
Plumbing, Gas Fittings	TM 5-810-5/AFM 88-8, Chapter 5	
Plumbing, General Requirements	Army-AEI Design Criteria Air Force-AFM 88-15, Chapters 15	
Plumbing, Health Facilities	AFR 88-50 (AF)	
Plumbing, Hot Water Supply	TM 5-810-5/AFM 88-8, Chapter 4	
Plumbing, Interceptors, Backwater Valves and Floor Drains	TM 5-810-5/AFM 88-8, Chapter 4;	
Plumbing, Legend of Symbols	ASHRAE Book of Fundamentals	
Plumbing, Medical Facilities	TM 5-838-2 (Army)	

MECHANICAL

Subject	Criteria References	Remarks
Plumbing, Physically Handicapped	EM 1110-1-103	See notes in rear of guide specifications.
Plumbing, Rainfall for Various Cities	National Standard Plumbing Code	
Plumbing, Sanitary Drainage and Vent Systems	TM 5-810-5/AFR 88-15, Chapter 15	
Plumbing, Vacuum Piping	TM 5-810-5/AFR 88-15, Chapter 15	
Plumbing, Water Softening Requirements	TM 5-813-3/AFR 88-10, Volume 3	
Plumbing, Water Supply and Distribution	TM 5-810-5/AFM 88-8, Chapter 4	
Solar Energy Systems	TM 5-804-2	